

## ELECTRONIC DART GAME

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### Field of the Invention

The present invention relates to an electronic dart game, particularly to a dart  
5 game with improved performance based on the principle of electromagnetic induction.

### Background of the Invention

Traditionally, a dart game is scored manually. In recent years, electronic  
dartboards have become popular as scoring can be done automatically by providing an  
electronic scoring means in those dart game. For example, US patent 6, 089,571  
10 discloses an interesting electronic dart game, as shown in Fig. 1. In the material of  
prior art, the surface of a dartboard is divided into several independent scoring  
sections 42. Each scoring section 42 is loosely attached to the dartboard and  
electrodes of a switch provided respectively on conductor sheets 31 and 33 is under  
each scoring section 42. When a dart (not shown) hits a specific scoring section 42 on  
15 the dartboard, the impact causes the section 42 to push against the electronic switch  
underneath, thus, send an electronic signal to an electronic scoring machine 10.

According to the disclosure of the prior art, referring to Fig. 2, the slide 70  
and the block 80 may be moved inward of the frame 40 against the springs 74 when  
the block 80 is shot by a dart 88. Obviously, the structure of the prior art for arranging  
20 the conductor means is complex and it is not very easy to mount as its precision for  
locating switch on resilient sheets 31 and 33.

In addition, since the individual sections on the surface of the dartboard of

the prior art are provided to be attached on the dartboard, the drawbacks of the prior art are also difficult to overcome. Referring to Fig. 3, the slides 70 each includes one or more pins 71 for engaging into the block 80 and for securing the block 80 to the slide 70. Thus it is easy to understand that the attachment between the blocks 80 and the dartboard are not in firmness manner and it can cause others drawbacks. Firstly, When a dart hits a specific section on the dartboard, other sections on the dartboard may also vibrate and may trigger other membrane switches, thus it not only causes confusion in scoring, but also the player can not have the same satisfactory sensation in comparison with an ordinary dart game. Secondly, removing a dart from any unstable section is not very easy.

#### Summary of the Invention

An object of the present invention is to provide an electronic dart game having a plurality of inductance coil and a magnetic dart to be used for scoring.

Another object of the present invention is to provide a method of automatic scoring for a dart game based on the principle of electromagnetic induction.

To achieve the above purpose, there is provided an electronic dart game comprising a dart; a dartboard, provided with a frame, formed a plurality of scoring areas by a plurality of radial spiders and circumferential spiders which are arranged crossly and a main body for being shot by the dart, attached with the frame; and an electronic scoring means for displaying signals collected from the scoring areas, wherein the dart game comprises a plurality of inductance coils with predetermined turns, provided with the frame and connected to the electronic scoring means through

cables; and the dart is magnetic substance.

In accordance with the present electronic dart game, the a plurality of inductance coils are provided with predetermined shape to be engaged with the scoring areas.

5 In accordance with the present electronic dart game, cross-section of each turn of the inductance coil matches and is smaller than that of the scoring areas.

In accordance with the present electronic dart game, the frame provided with the inductance coil is arranged in front of the main body.

10 In accordance with the electronic dart game, the frame provided with the inductance coil is arranged in back of the main body.

In accordance with the electronic dart game, the frame provided with the inductance coil is arranged in the main body.

15 In accordance with the electronic dart game, a plurality of the coils corresponded to different scoring areas representing the same score, are wired together before being connected to the electronic scoring means.

In accordance with the present electronic dart game, a point of the dart is magnetic substance.

In accordance with the present electronic dart game, a slender shaft of the dart is magnetic substance.

20 In accordance with the present electronic dart game, the point and slender shaft of the dart are integrated and magnetized simultaneously.

In accordance with the present electronic dart game, the main body of the

dartboard is made of bristle, natural fiber, synthetic fiber, plastic or the combination thereof.

A method of automatic scoring for an electronic dart game, comprises the step of: dividing a dartboard into a plurality of areas by utilizing a frame and establishing a score for the each areas; attaching a main body for being shot by a dart to the frame; providing a plurality of inductance coils in predetermined shape engaged with the areas on the frame and connecting the coils to a scoring means of the dart game; magnetizing a point and slender shaft of the dart for changing distribution of magnetic field of the inductance coil at the moment of the main body of the dartboard being shot by the dart.

In accordance with the present method comprises the step of: providing cross section of the each turn of the inductance coil to be smaller than that of the related areas; wiring the coils representing the same score all together before being connected to a electronic scoring unit.

In one aspect of the present invention, present dart game has a stable one-piece surface so that the player has a similar satisfactory sensation as shooting onto a classical one-piece dartboard.

In another aspect of the present invention, as a plurality of electromagnetic induction coils are firmly attached to the stable one-piece surface, the electronic scoring signal is generated only at the moment the dart hitting the scoring areas on the dartboard, the chances for erroneous signal to occur is very slim.

In accordance with further aspect of the present invention, the dart is easier to

remove from the dartboard in comparison with the electronic dart game of the prior art.

#### Brief Description of the drawings

With reference to the following drawings, the preferred embodiments of the present invention shall be illustrated in detail.

Fig. 1 is an exploded view of an electronic dart game of the prior art;

Sub. a1 > Fig. 2 is a cross sectional view illustrating the operation of the switch used for conducting signal;

Sub. a2 > Fig. 3 is a partial exploded view of the segment, in which the segment is shown up side down;

Fig. 4 is a perspective view of the dartboard of the present invention, showing a frame formed by a circumferential and radial spider;

Fig. 5 is a partial sketch view of a preferred embodiment of the dartboard of the present invention, on which is shot by the dart;

15 Fig. 6 is a partial sketch view of another embodiment of the dartboard of the present invention, on which is shot by the dart;

Fig. 7 is a partial sketch view of further embodiment of the dartboard of the present invention, on which is shot by the dart;

Sub. a3 > Fig. 8 is a perspective view of the dartboard of the present invention.

#### 20 Description of the Preferred Embodiments

The present electronic game comprise a dartboard having a number of scoring areas for being shot by player and an electronic scoring means for displaying

signals collected from the scoring areas.

Sub. a4> Now referring to Fig. 4, the dartboard of the present invention includes a frame 100 and main body 110 attached to the frame 100. A plurality of scored areas 102 is formed by a plurality of radial spiders 106 and circumferential spiders 104 which are arranged crossly each other. Each of the scoring areas 102 is respectively provided with a inductance coil 120. Each of coils 120 may be made up of several turns and each turn is needed to form a predetermined shape in order to match the scoring areas 102. As matter of fact, cross-section of each turn of the inductance coil 120 is smaller than that of scoring areas 102 to ensure that coil 120 can be provided on the frame 100 completely. In addition, the inductance coil 120 is connected to a control unit of an electronic scoring means designed in the present dart game (not shown) through cables 122, which can display signals collected from the scoring areas 102.

Various score are assigned to the scoring areas 102 in the dartboard. It is possible that some of areas 102 will be evaluated the same score. Preferably, a plurality of the coils 120 of the present invention corresponded to different scoring areas 102 representing the same score, are wired together before being connected to the electronic scoring means (not shown).

Sub. a5> The main body 110 of the dartboard is attached to the frame 100 and used for being shot by the dart 130. Therefore the main body 110 should be made of bristle, natural fiber, synthetic fiber, plastic or the combination thereof. In accordance with the present invention, the structure of the dartboard is substantially as simple as the

traditional manual one and is easy to operation, as the inductance coils 120 can be directly provided on the frame 100. In addition, the frame 100 and main body 110 of the dartboard can be arranged in flexible manner. Referring to Fig. 5, in the first preferred embodiment, the frame 100 provided with the inductance coil 120 of the present invention is arranged in front of the main body 110. In the second embodiment, as shown in Fig. 6, the frame 100 provided with the inductance coil 120 is arranged within the main body 110. Obviously, the frame 100 provided with inductance coil 120 can be arranged in back of the main body 110, as shown in Fig. 7.

To achieve the object of the present invention, another essential part of the present invention is the dart 130, as shown in Fig. 8. The dart 130 usually comprises a point 132; a slender shaft 134 and a tail fin 136. Particularly, the dart 130 of the present invention is magnetic substance. That is, a slender shaft 134 and the point 132 can be magnetized respectively or be integrated and magnetized simultaneously.

When the dart 130 with a magnetic point 132 is shot onto the main body 110 of the dartboard, the instantaneous displacement of the magnetic point 132 through the coil 102 induces a current or voltage signal on the coil 102 in accordance with Lenz's law; the signal can be amplified in a signal processor (not shown). Then the amplified electronic signal will be transmitted to an electronic scoring means (not shown) to engage in calculation and display. Once the dart 130 is stuck on the dartboard, there is no more induction current.

Because the instantaneous electronic signal is induced only at the moment the magnetic point 132 of the dart 130 is moving through the coil 102, confusion in

electronic scoring can be avoided.

It is necessary to point out that the magnetic part of the dart 130 needn't go through the coil 130 completely; an electronic signal can be inducted even when the dart 130 closing with the coil 130, as magnetic lines of force around the dart 130 has  
5 already cut by the coil 102, as shown in Fig. 5.

Furthermore, the electronic signal of the present invention to be in calculation and display is generated by magnetic lines of force of the dart 130 cutting the coil 102 when the dart 130 is shot to go through the object areas. The intensity of electronic signal will depend on the elements, such as density of magnetic lines of force, turns of  
10 coil and rapidity for cutting magnetic lines of force etc. In other words, the generated signal dimension is in direct proportion with these elements. Therefore, the manner for enhancing the magnetism of dart to increase the density of magnetic lines of force or increasing turns of coil or increasing rapidity of dart can be applied if the control unit of the present dart game requires a rather large signal. Actually, it is better that  
15 the present invention needn't design much more turns in coil and thus costs for the present invention can be reduced accordingly, as the rapidity of the dart will be large enough to generate an available signal to be collected easily. In another aspects, an electronic signal can not be generated when the rapidity of the dart through the coil is lack, so the chances for erroneous signal to occur is very slim, such as when a player  
20 removing the dart from the dartboard. In other aspects, the signal of the present invention will be generated at the moment the dart hitting the dartboard and will disappear off the coil after the dart hitting the dartboard as the rapidity at the moment



is zero. Therefore, the method of scoring at each time for the present invention is unique, even when the same object area is shot many times without removing the dart from the area, the signal can be collected exactly and the signal can be transmitted only from the coil surrounded the dart however the point shot by the dart is adjacent  
5 to another scoring areas. Therefore, the method of the present invention for scoring is accurate and applicable.

The above description should not be construed as limiting the scope of this invention but as merely proving the illustration of some of the presently preferred embodiments of the invention. For example, the dartboard in the present invention  
10 and an electronic scoring means may be combined into one entity.